SSVEO IFA List **Date:02/27/2003**

STS - 41C, OV - 99, Challenger (5) **Time:04:29:PM**

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Prelaunch	Problem	**FIAR**	**IFA** STS-41C-V-01	DPS
	GMT: Prelaunch		**SPR** AC7900	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: MDM FF1 Card 5 Failed. (ORB)

Summary: DISCUSSION: During the STS 41-C prelaunch checkout, the MDM (multiplexer demultiplexer) FF1 failed. KSC troubleshooting isolated the problem to MDM card 5. The MDM (serial number 94) was removed, replaced and all associated critical circuits were reverified or the reverification was waived.

The replacement MDM operated normally throughout the STS 41-C mission. The failed MDM was returned to the vendor where the problem was confirmed to be on card 5 DOL (discrete output low) channel zero. The problem disappeared during troubleshooting, but was repeated on two occasions during extensive ATT's (acceptance thermal tests). From circuit analysis, it was concluded that the problem was most probably a failure of the CD4001 NAND gate in the DOL control hybrid. The hybrid has been removed for detailed physical analysis. There have been no previous failures of this hybrid on the Orbiter. CONCLUSION: The failure of MDM FF1 card 5 was most probably caused by a failed CD4001 NAND gate in the DOL control hybrid. CORRECTIVE_ACTION: The hybrid is undergoing further failure analysis. The results of this activity will be tracked via CAR AC7900. MDM FF1 (serial number 94) will be repaired and returned to the MDM inventory. CAR ANALYSIS: Testing of D05 showed one failure due to thermal sensitivity which could never be repeated. Detailed physical analysis was performed and no defect could be attributed to the anomaly. D05 has been removed from service and MDM FF1 has been repaired and returned to service. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** -001:07:51	Problem	**FIAR**	**IFA** STS-41C-V-02	DPS
	GMT: 096:21:49		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Solid Rocket Booster Automatic Separation Enable Command "A" FAiled. (ORB)

Summary: DISCUSSION: After the preflight changeout of MDM (multiplexer/demultiplexer) FF1, the SRB (solid rocket booster) automatic separation enable command "A" failed prelaunch checkout at about 096:21:49 G.m.t. The redundancy management software operated on automatic B and C commands for launch. If 2 of 3 automatic commands fail, the software goes to auto/manual and uses 3 different MDM FF1 channels.

Postflight troubleshooting revealed a broken wire to a connector on MDM FF1. The wire was repaired and a satisfactory retest was performed. CONCLUSION: The SRB automatic separation enable command "A" failed because of a broken wire to a connector on MDM FF1. CORRECTIVE_ACTION: The broken wire to MDM FF1 was repaired and retested. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Prelaunch	Problem	**FIAR**	**IFA** STS-41C-V-03	INS
	GMT: Prelaunch		**SPR** 13F006, 13F005, 13F003	**UA**	**Manager:**
				PR	
			IPR		**Engineer:**

Title: Instrumentation Failures. (ORB)

Summary: DISCUSSION: A. External tank hydrogen 100-percent fill sensor (T41X1718E) operated intermittently. During prelaunch operations, one of the two 100-percent sensors indicated wet falsely. Postflight, the Orbiter signal conditioner circuitry for this sensor was verified as operating properly at KSC. The signal conditioner has been removed from the vehicle and returned to the vendor for further testing. Analysis will be tracked on CAR 13F006.

CAR ANALYSIS: The failure couldn't be verified during vendor failure analysis of the signal conditioner. The suspected cause of failure was circuit card distortion caused by the card coming out of its guides during signal conditioner depressurization and then being severely distorted during repressurization during a prior mission. The circuit card was jammed and damaged during removal at the vendor. [not included in original problem report] B. APU 3 exhaust gas temperature measurement (V46T0342A) failed. The measurement dropped 500 deg F at APU startup and was noisy during ascent. The measurement sensor was faulty and will be replaced. One of two exhaust gas temperatures is required for launch. A design change to improve the sensor lead wire insulation and thermocouple wire integrity is in work. Failure analysis will be tracked on CAR 13F005. CAR ANALYSIS: Analysis not performed. Suspect wiring junction within sensor became debonded. Ruggedized sensor planned for replacement. [not included in original problem report] C. SSME 2 gaseous hydrogen pressurization outlet pressure measurement failed. The measurement failed at lift-off + 190 seconds. Previous failures have occurred on STS-6,-7,-8 and 41-B. A newly designed sensor mounting will be used for STS 41-D and subsequent. Failure analysis will be tracked on CAR 13F003. CAR ANALYSIS: This is only the most recent of many failures of this type sensor in this position. It is known that the vibration environment is too severe for the sensor as it is mounted. Redesigned mounting is planned for STS-41D. [not included in original problem report] D. OMS left

pod skin temperature measurement (VO9T1030A) read low. During entry heating, this temperature measurement read 60 deg F. A corresponding temperature measurement on the right pod read 180 deg F. Analysis indicates that the temperature difference is a result of the thicker insulation on this area of the OV-103 OMS pod which was flown on OV-099 for this flight. The measurement is functioning normally and no corrective action is necessary. CONCLUSION: See above. CORRECTIVE_ACTION: See above. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification		Documentation	Subsystem
MER - 0	**MET:** 000:00:01	Problem	**FIAR**	**IFA** STS-41C-V-04	APU
	GMT: 097:13:59		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: APU-1, -2 And -3 Gas Generator Valve Module Temperatures (V46T0171A, V46T0271 And V46T0372A) Dropped During Ascent. (ORB)

Summary: DISCUSSION: During the STS 41-C ascent, the APU -1, -2 and -3 gas generator valve module (GGVM) temperatures decreased. About 1 minute and 50 seconds after launch, the APU-2 GGVM temperature dropped 16 to 18 deg F followed at 2 minutes and 15 seconds by the APU-1 GGVM temperature decreasing 6 to 8 deg F over an equivalent time period of about 15 seconds. The APU-3 GGVM temperature also decreased by 6 deg F starting at launch to about 1 minute after launch.

In reviewing the data from previous missions, the same GGVM temperature profiles can be seen on numerous other flights, though not to the level seen on STS 41-C. Data from STS-6 through STS-41 show that drops of approximately 5 deg F are not uncommon. All primary water system control valves were checked out prior to STS 41-C because of the STS 41-B water isolation valve failure (reference flight problem STS 41-B-1). After the checkout was performed, the water was not drained from the manifolds and flex hoses. The most likely cause of the GGVM temperature drop on all three APU's was water from the water system manifold impinging on the temperature transducer that is located under the water manifold. Water was contained in the water line at approximately 15 psia upstream of a 1 to 2 psid check valve. When the ambient pressure decreased, the check valves opened which forced out a small amount of water which impinged on the transducer. During the launch phase as altitude increased, the corresponding ambient pressure decreased causing the water near the transducer to flash which in turn dropped the temperature of the transducer. A contributing factor to this condition is the effects of vehicle dynmaics such as launch or SRB separation, either of which could cause the check valve to momentarily open. This effect was noted on APU-3 GGVM at launch. APU -1, -2 and -3 GGVM temperatures during descent were all nominal with no leak indications present. CONCLUSION: The most likely cause of the GGVM temperature decreases on all three APU's was water from the water manifold impinging on the temperature transducer that is located under the water manifold. Review of previous flight data showed a signature that was similar, but not to the level recorded on STS 41-C. CORRECTIVE_ACTION: NONE EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification		Documentation	Subsystem
MER - 0	**MET:** 000:17:52	Problem	**FIAR**	**IFA** STS-41C-V-05	EPD

GMT: 098:07:50 **SPR** 13F013 **UA** **Manager:**

IPR **PR**

Engineer:

Title: Aft Motor Control Assembly -2 Status Discrete Showed Open. (ORB)

Summary: DISCUSSION: At approximately 098:07:50 G.m.t., the aft (MCA) motor control assembly -2 operational status 1 (V76X2261E) failed to return to its NO-OP (non-operating) state after reconfiguring some OMS (orbiter maneuvering system) valves. This indicates that one of the relays in a chain of 15 did not return to its nonenergized state. However, all valves indicated that they were in proper position. Also, the ac currents dropped after the sequence, indicating that none of the valve motors were driving. At approximately 099:07:00 G.m.t., the right OMS crossfeed valve B was commanded closed, but the fuel valve did not respond and remained open. The switch was reset to the open position. Apparently relay K51 in aft MCA-2 (for open A power to right OMS crossfeed valve B was stuck in an intermediate position. The K-51 relay must be in the non-energized position to close the crossfeed valve. The crossfeed operation was complete using the isolation valves.

Postflight troubleshooting confirmed that relay K-51 had failed and the MCA has been removed and returned to the vendor for failure analysis. These hybrid relays are 100-percent PIND (particle impact noise detection) tested during the manufacturing process. During early acceptance testing of these hybrid relays, a number of failures of this type occurred. Weld expulsion material was found in some of the relay assemblies and this caused the mechanisms to hang-up in the intermediate position. The inspection procedures were improved and only 2 failures have occurred since the tightening of the inspection procedures. There are a total of 552 hybrid relays of this type used on each Orbiter. None of these are used in a criticality 1 application and this is the first flight failure of these relays. CONCLUSION: The relay failure in aft MCA-2 was most probably caused by contamimantion in the relay assembly. Crossfeed operations can be completed using the isolation valve, should this failure recur. Other MCA relay functions are protected by vehicle redundancy. Present inspection and fabrication procedures are acceptable for these relays. CORRECTIVE_ACTION: Aft MCA-2 has been removed and returned to the vendor for failure analysis that will be tracked on CAR 13F013. The MCA will be replaced and its function will be verified. CAR ANALYSIS: Analysis disclosed a particle in the relay. This was a one time failure and not a generic problem. No further action is planned. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 001:02:43	Problem	**FIAR**	**IFA** STS-41C-V-06	C&T - Ku-band
	GMT: 098:16:41		**SPR** 13F010	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Ku-Band Rendezvous Radar Failed Self-Test And Lost Lock. (ORB)

Summary: DISCUSSION: During on-orbit operations starting at about 098:16:41 G.m.t., the Ku-band rendezvous radar experienced sporadic AGC (automatic gain

control) spiking and false detections. When these conditions were present, the radar failed the self-test. Throughout the mission, the self-test failed eight times out of eleven attempts. A special inflight EMI (electromagnetic interference) test was conducted and, although three of the radar self-test failures occurred during the test, there was no correlation with the operation of any suspected Orbiter radiating source.

Following the SMM (Solar Maximum Mission) satellite repair and subsequent deployment, the radar lost lock because of antenna obscuration which automatically powers down the TWTA (traveling wave tube assembly). When the antenna came out of obscuration, the radar failed to reacquire the satellite. AGC spiking and false detections were present before and during the reacquisition attempt. After this reacquisition attempt, the communications mode was used for the remainder of the mission. AGC spiking has occurred in only the short-range and detection mode. These spikes have always preceded the self-test failures; however, self-tests have also been passed when the AGC spikes were present. The Ku-band has failed to supply needed data in the short-range mode only twice. These were the failure to track EV-1 crewman during the first EVA (extravehicular activity) of STS 41-B and the failure to reacquire the SMM during the second separation as stated above. In general, however, the acquisition performance of the rendezvous radar has been acceptable. During postflight testing, a special EMI (electromagnetic interference) test in which various Orbiter equipment was powered on during radar operations could not duplicate the inflight problem. A special test in which a 13-gigahertz signal was injected into the radar front end was successful in duplicating the AGC spiking and false detections. The test data are being reviewed to determine if the problem is internal to the radar. An investigation into possible external radiating sources in addition to those on the Orbiter is also being conducted. The radar is not required for STS 41-D. CONCLUSION: The cause of the rendezvous radar AGC spiking and false detections is unknown. CORRECTIVE_ACTION: The effort to identify possible external radiating sources in addition to those on the Orbiter will continue. The test data from the KSC postflight testing will be further reviewed in an attempt to determine the cause of the noted anomaly. The results of this activity will be tracked via CAR 13F010. CAR ANALYSIS: This is the same as CAR 11F021. An outside source of CW interference is suspected. No on-board equipment is omitting this frequency. Action to find the cause is continuing. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 001:21:08	Problem	**FIAR**	**IFA** STS-41C-V-07	OMS
	GMT: 099:11:06		**SPR** 13F001	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Right Orbital Maneuvering System Fuel Tank Isolation Valve System A Position Indicator Miscompare. (ORB)

Summary: DISCUSSION: At approximately 99:10:11 G.m.t., the RCS (reaction control system) interconnect was switched from the right-hand OMS (orbital mauevering system) tank to the left-hand tank. Because of the inability to close the right-hand B-leg fuel crossfeed valve (see problem STS-41C-5), the interconnect was performed by

closing the right-hand OMS tank isolation valves. At 99:11:06 G.m.t., the right-hand OMS A-leg fuel-tank isolation valve began simultaneously indicating the open and closed positions.

The right-hand OMS fuel-tank system-A isolation valve circuitry is redundant in that two switch failures are required to prevent the valve from opening. A subsequent failure of the redundant open switch after the valve position miscompare would have resulted in a failed closed valve. The system design provides two tank isolation valves (A and B) that are manifolded together to provide redundancy, should one valve fail closed. Postflight testing has duplicated the valve position indication miscompare. CONCLUSION: The right OMS fuel-tank isolation-valve system-A position indicator miscompare is most likely the result of an open microswitch in the valve failing in the on position. CORRECTIVE_ACTION: The right OMS fuel-tank isolation-valve system-A actuator will be removed, replaced and returned to the vendor for failure analysis. The failure analysis will be tracked by CAR 13F001. CAR ANALYSIS: This and many other switch problems is attributed to conductive and nonconductive particles floating within the switch containers in zero G. Problem switches are being replaced as replacement switches (without contaminants) become available. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification		Documentation		Subsystem
MER - 0	**MET:** 002:01:35	Problem	**FIAR**	**IFA** STS-41C-V-08		PYLD
	GMT: 099:15:33		**SPR**	**UA**		**Manager:**
			IPR	**PR**		
						Engineer:

Title: Solar Maximum Trunnion Pin Failed To Actuate The Capture Mechanism Of The Trunnion Pin Attachment Device. (GFE)

Summary: DISCUSSION: During EVA (extravehicular activity) docking operations with the Solar Maximum Mission (SMM) satellite on STS 41-C, three docking attempts were unsuccessful. Although a TPAD (trunnion pin attachment device) malfunction might have resulted in the failure to dock, evidence during the flight indicated that the TPAD was functioning normally. The capture mechansim was confirmed to be operational by the EVA crewman after destowage of the TPAD on EVA 1 prior to the flyover to SMM for the attempted docking. Upon returning to the Orbiter after the unsuccessful docking attempets, the trigger mechanism was again confirmed to be operational. During STS 41-C, it was postulated that the TPAD mechanism may have been adversely affected by low temperatures. The temperature of the TPAD was not maintained after removal from the FSS (flight support system) storage locker. The design of the TPAD was predicated on operation after a 6-hour cold soak (which results in approximately -20 deg F TPAD hardware temperatures), although a more severe temperature was used for certification testing (i.e., -40 deg F). Since the TPAD on STS 41-C was only exposed to deep space for about 2 hours, it was much warmer than the design case. The TPAD was approximately 40 deg F when destowed. By analysis, the temperature of the TPAD at the time of the docking attempts was determined to be approximately 10 deg F, and at the time of restowage in the FSS it was approximately zero deg F. Since the trigger actuated and released the TPAD jaws both before and after the docking attempts, a malfunction caused by exposure to the

thermal environment of space is ruled out. A failure caused by the thermal environment is also ruled out in light of the successful thermal/vacuum acceptance test conducted on the flight TPAD at -20 deg F before shipment to KSC.

When the flight TPAD was returned to Houston after STS 41-C, the appropriate steps from the TPAD PDA (pre-delivery acceptance) test procedure were performed to obtain representaive performance data. The dimensional information obtained, as well as measured forces required to trigger the docking mechanism were perfectly normal. Therefore, it is concluded that the inflight problem was not caused by a malfunction of the TPAD since the TPAD was successfully tested prelaunch, on-orbit (before and after the unsuccessful docking attempts), and post-landing. During the STS 41-C mission, Astronaut Nelson discovered a fiberglass standoff (used to mount thermal insulation) in close proximity to the trunnion pin. Since the docking mechanism of the TPAD is actuated when the trunnion pin depresses a trigger located in the throat of the capture system, an obstruction preventing full penetration of the trunnion pin would prevent docking and thus explain the anomaly. To assess the magnitude of the obstruction, Nelson measured the standoff, both its height and radial distance from the trunnion pin, during the second EVA. He also observed that the standoff was securely fixed in its relationship to the trunnion pin, and the insulation blanket was stretched tautly and held away from the satellite surface structure, being affixed at the tip of the fiberglass pin standoff. A layout of the trunnion pin and its immediate vicinity was made based on the measurements obtained on-orbit defining the location and dimensional characterisitics of the fiberglass standoff. Using this layout, the unobstructed trunnion pin length was determined to be less than the minimum length needed to trigger the docking mechansim (as measuared on the TPAD post-mission); thus, the obstruction was dimensionally adequate to have caused the unsuccessful docking attempts. Since the obstruction was at a "point" (not circumferential), the pitch angle of the TPAD at the time of impact could have a bearing on trigger actuation. During training, Astronaut Nelson practiced docking on the trunnion pin slightly pitch-down to prevent foot contact with the satellite and also enhance visibility. Nelson's post-flight statement confirm that his approach was slightly pitch-down to "dead-on" for the three attempts. The layout was then used to investigate pitch angles. For all positive and neutral pitch angles, capture is prevented by the fiberglass standoff obstruction. There is, however, a small window (2.5 deg to 18 deg pitch-up) that would theoretically allow the trunnion pin to actuate. Astronaut Nelson did not come into this envelope during his three unsuccessful attempts. The TPAD, which was used successfully with two trunnion pin mockups (which were dimensionally correct) on STS 41-B, was also on STS 41-C, but without post-flight refurbishment of the surfaces. Although the jaw/throat area was not in pristine condition, it was postulated that a detectable transfer of fiberglass material might have occurred upon TPAD impact with the SMM. Therefore, a microscopic investigation of the TPAD throat/jaw area was conducted after STS 41-C. Also, a duplicate of the fiberglass pin standoff was examined. The report concluded: "This analysis found no positive evidence of fiberglass pin contact with the TPAD, i.e., transfer of the fiberglass pin binder or fibers to the TPAD surfaces. Absence of such evidence does not rule out contact because the toughness and abrasion resistance of the virgin material suggest no such transfer should occur under the relatively light impact conditions that occurred." CONCLUSION: Interference caused by a fiberglass standoff near the trunnion pin (which secured the thermal insulation of the SMM) was sufficient to prevent the SMM trunnion pin from contacting the trigger ring for release of the TPAD jaws.
CORRECTIVE_ACTION: NONE EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 001:17:42	Problem	**FIAR**	**IFA** STS-41C-V-09	Water and Waste
	GMT: 099:07:40		**SPR** 13F008	**UA**	Management System
			IPR	**PR**	**Manager:**
					Engineer:

Title: Waste Collection System Fan Separator No. 2 Failed And Fan Separator No. 1 Air Flow Was Degraded. (ORB)

Summary: DISCUSSION: During the STS 41-C mission, the crew experienced low air flow on WCS (waste collection system) fan separator no. 1, switched to fan separator no. 2 which operated normally for a short time and then failed. Fan separator no. 1 was reported to have emitted normal rotation sounds.

An onboard check for a plugged odor/bacteria filter showed no evidence of water in the line or filter. Further inflight troubleshooting, including cycling the main bus B WCS controller circuit breaker, temporarily restored the use of fan separator no. 2. During postflight tests at KSC, the WCS mode selector assembly was turned to WCS/EMU with fan separator no. 2, and the fan separator operated normally. The mode selector assembly was turned off, then on, and fan separator no. 2 did not operate. Cycling the main bus B WCS controller circuit breaker failed to restore operation. It was determined that vehicle ac and dc power was present at the WCS. The WCS mode selector assembly was again turned off, then on, and fan separator no. 2 operated normally. Also, the urinal hose in-line screen was 75 percent clogged with debris. This screen is just downstream of the urinal prefilter which is replaced daily by the crew. Urinal air flow increased from 6.4 cfm to 9.9 cfm after the debris was removed from the screen. The WCS was returned to the vendor for further tests which revealed an intermittent limit switch in the mode selector assembly. The switch was removed for failure analysis. CONCLUSION: The degraded fan separator air flow was caused by the clogged urinal hose in-line screen. The inoperative fan separator no. 2 was caused by an intermittent limit switch in the mode selector assembly. CORRECTIVE_ACTION: Crew training and procedures will be revised to include inspecting and cleaning, if required, the urinal hose in-line screen. Two manual override switches, one for each fan separator, will be installed effective STS 41-D and subsequent to bypass the WCS mode switch and fan separator select switch. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:02:12	Problem	**FIAR**	**IFA** STS-41C-V-10	RMS
	GMT: 099:16:10		**SPR** 13F004	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Remote Manipulator System Deploy Switches For Shoulder Manipulator Positioning Mechanism Indicated Zero. (RMS)

Summary: DISCUSSION: During the attempted capture of the rotating Solar Maximum Mission (SMM) spacecraft, both shoulder deploy microswitches on the deployed

MPM (manipulator positioning mechanism) indicated zero (i.e., not deployed). The MPM was commanded to deploy and the deploy indications returned to normal within 0.5 second. The rapid return to the deployed state indicates that the mechanism was safely latched in the deploy position and fully operational. The problem had no mission impact and did not recur during subsequent RMS (remote manipulator system) operations.

Minor relaxations of the MPM induced by thermal or mechanical loads coupled with the sensitive mechanism rigging could cause the operation of these position-sensitive microswitches. The problem could not be repeated at KSC. The rigging and electrical circuits of the microswitches have been verified as correct. CONCLUSION: The RMS deploy switch malfunction was most probably caused by minor deflections within the MPM assembly. If this indication were to recur, the MPM would be commanded to deploy as on STS 41-C. CORRECTIVE_ACTION: The rigging and electrical operation of the microswitches has been verified as correct. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 003:23:06	Problem	**FIAR**	**IFA** STS-41C-V-11	RCS
	GMT: 101:13:04		**SPR** 13F001	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Left Reaction Control System Fuel 3, 4 and 5 Tank Isolation Valve B Status Lost. (ORB)

Summary: DISCUSSION: At 101:13:04 G.m.t. when the OMS/RCS (orbital maneuvering system/reaction control system) propellant interconnect was terminated, the left RCS tank isolation 3/4/5 B valve failed to show an open indication when the cabin switch was cycled to the open position. The cabin switch was then placed in the "GPC" position to remove power from to valve.

At 101:17:48 G.m.t., the left RCS tank isolation 3/4/5 B fuel valve cabin switch was cycled to the closed position and the valve cycled closed with all indications reading correctly. The entry configuration required that the fuel tank isolation 3/4/5 B valve be placed in the open position for 5 seconds, and then repositioned to GPC. The isolation valve again failed to show an open indication. However, this configuration probably left the valve in the open position as required even though the position talkback did not indicate open. Redundancy was thus provided for feeding the 3, 4, 5 manifolds through fuel valves A and B during entry. Postflight testing could not duplicate the loss of "open" status for the left RCS tank isolation 3/4/5 fuel B valve. The valve actuator has been removed, replaced and returned to the vendor for failure analysis. CONCLUSION: The left RCS tank isolation 3/4/5 fuel B valve open status loss was most like ly due to an insulating particle which, in zero gravity, floated between the open contracts on the valve actuator. CORRECTIVE_ACTION: The left RCS tank isolation 3/4/5 fuel B valve actuator was removed, replaced and returned to the vendor for failure analysis. The results of the analysis will be tracked by CAR 13F001. CAR ANALYSIS: This and many other switch problems is attributed to conductive and nonconductive particles floating within the switch containers in zero G. Problem switches are being replaced as replacement switches (without

contaminants) become available. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 004:00:24	Problem	**FIAR** EE-0583F	**IFA** STS-41C-V-12	C&T
	GMT: 101:14:22		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Payload Bay TV Camera B Experimental Laser Range Finder Could Not Be Turned On And Camera C Range Finder Would Not Turn Off. (GFE)

Summary: DISCUSSION: The laser range finder was flown as an experiment.

The crew reported that the camera B laser range finder had failed. A blown fuse, resulting from power supply heating, was suspected as the cause. The camera C laser range finder display could not be commanded off due to a logic hang-up. The camera power was cycled to reset the logic circuitry. The range finder was not used again during the mission. CONCLUSION: Preliminary analysis has indicated that a more detailed test and analysis of the equipment is required. It is expected that the additional test and analysis will dictate a redesign of the power supply and the system control logic. CORRECTIVE_ACTION: No corrective action has been taken since this equipment was flown as an experiment. Additional funding/direction will be required for the continuation of the experiment and the investigation of the failure. FIAR ANALYSIS: Failed items were one flight experiments. Analysis will not be undertaken until they are scheduled for re-flight. In the interim, references to the anomaly are contained in FIAR EE-0583F. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR** EE-0584F	**IFA** STS-41C-V-13	C&T
	GMT: 102:14:20		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Payload Bay Television Camera D Blurred And Camera C Focused Only To About 10 Feet. (GFE)

Summary: DISCUSSION: The crew reported during EVA-2 (extravehicular activity) MMU (manned maneuvering unit) checkout that the camera D lens appeared to be fogged as if it had a fuzzy spot in the middle. The ground controllers confirmed that the picture did appear blurred. Camera A was then used for primary viewing from the forward payload bay bulkhead.

The crew also reported that Camera C would only focus up to about 10 feet, or to the wrist of the RMS (remote manipulator system). The cameras were removed at KSC and have been checked, but the problems indicated by the crew could not be duplicated. The camera D lens was clear and no internal fogging or smearing was evident, and camera C was successfully focused through its entire range. CONCLUSION: The reported problems could not be duplicated in post-mission testing, therefore, the causes are unknown. There have been no similar non-repeatable problems reported on previous flights. CORRECTIVE_ACTION: The cameras will be retested prior to installation on vehicles for future missions. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 004:18:01	Problem	**FIAR** EE 0582F	**IFA** STS-41C-V-14	CREW
	GMT: 102:07:59		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Extravehicular Crewman Lost Sidetone In Mode "A". (GFE)

Summary: DISCUSSION: At about 102:07:59 G.m.t., the EV (extravehicular) -2 crewman reported loss of sidetone in mode "A" during EVA (extravehicular activity) 2 communications checkout. Noisy and degraded communications were experienced by EV-2 throughout the mission and this problem is related to the EV-1 communications anomaly reported in problem report STS-41C-15. EV-1 had a broken shield on the antenna cable which reduced the power output 30 dB below the nominal value and caused a reduced signal-to-noise ratio. This produced static and EV-2 reduced the receiver volume control levels to 3 or 4 (nominal setting is 5) and the sidetone was thus not audible.

Postflight testing of the EV-2 communications system indicated that the sidetone was within the -14 dBm plus/minus 5 dBm (nominal) level. CONCLUSION: The apparent loss of sidetone by EV-2 was caused by low signal levels receive from EV-1 and the subsequent crew action to reduce the volume (level) control settings because of the associated high noise levels. CORRECTIVE_ACTION: The EMU (Extravehicular Mobility Unit) preflight test procedure will be revised to incorporate a power output measurement to preclude shipment of any unit with low output power levels. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:01:32	Problem	**FIAR** EE 0582F	**IFA** STS-41C-V-15	CREW
	GMT: 099:15:30		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Extravehicular Activity Communications Degraded. (GFE)

Summary: DISCUSSION: At about 099:15:30 G.m.t., during the EVA 1 (extravehicular activity) communications checkout, noisy and degraded VHF communications were experienced. The condition persisted throughout both EVA's. Real-time monitoring of downlink parameters indicated that the EV-1 signal strength was 20 to 30 dB below the predicted levels.

Postflight troubleshooting verified that the EV-1 signal output level was 30 dB below the nominal level, and the EV-2 output signal strength was nominal. Subsequent investigations revealed a broken shield on the EV-1 antenna cable. This caused an impedance mismatch in the RF path to the antenna, thus reducing the power output levels. The resulting low signal strength prevented proper communications and caused the related EV-2 problem reported in problem report STS-41C-14. CONCLUSION: The noisy and degraded EVA communications were caused by an open shield in the EV-1 antenna cable. This affected EV-1 communications with both the Orbiter and EV-2. CORRECTIVE_ACTION: The EV-1 antenna shield will be repaired. In addition, the EMU (extravehicular mobility unit) preflight test procedures will be modified to incorporate a power output measurement to preclude shipment of any unit with low output power levels. Also, the antenna cable handling procedures are being evaluated to preclude damage during ground handling. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 005:14:32	Problem	**FIAR**	**IFA** STS-41C-V-16	APU
	GMT: 103:04:30		**SPR** 13F011	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Auxiliary Power Unit 2 Pump Water Line (V46T0294A) System B Heater Failed. ()

Summary: DISCUSSION: At approximately 05:14:30 MET (mission elapsed time), the APU (auxiliary power unit) 2 water "B" secondary line temperature (V46T0294A) was at 45 deg F and decreasing. The heater had been cycling at about 53 deg F. The heater was declared failed and APU 2 water system A heater was selected. The temperature increased and normal heater operation was observed.

At 06:14:00 MET, an inflight thermostat test was performed by switching the water line heater back to system B. The heater cycled normally at 53 deg F. Water line heater system A was again reselected for the entry configuration to protect against another transient failure. Postflight tests have verified high contact resistance in the water line system B thermostat. The thermostat will be replaced and a failure analysis will be performed on the removed unit. CONCLUSION: Most likely the high resistance of the thermostat measured during postflight tests caused the APU 2 water line system B heater to intermittently fail during the STS 41-C mission. CORRECTIVE_ACTION: The APU 2 water line system B heater thermostat will be removed and replaced. Failure analysis for the thermostat will be tracked on CAR 13F011. CAR ANALYSIS: Contact resistance of thermal switch (S015B) was high and erratic. The high/ erratic resistance is believed to be caused by contamination found on the switch contacts following disassembly of the switch. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification		Documentation		Subsystem
MER - 0	**MET:** 006:00:41	Problem	**FIAR**	**IFA** STS-41C-V-17		EPD
	GMT: 103:14:39		**SPR**	**UA**		**Manager:**
			IPR	**PR**		
						Engineer:

Title: Flight Support System Keel Retention Latch Drive Motor Lost Phase A. ()

Summary: DISCUSSION: Phase A of the ac voltage dropped out on the motor as the Flight Support System (FSS) keel retention latch drive motor was driving to the latched position. The keel retention latch completed latching properly and subsequently released properly with only 2 phases driving the motor. Since ac phase A did not drop out on any other FSS latch motor, the fault was isolated inside the FSS. Each latch on the FSS has two drives used to open or close the latches.

The FSS has been removed from the payload bay and returned to the vendor for failure analysis. CONCLUSION: Loss of ac phase A to the FSS keel retention latch drive motor was isolated inside the FSS. CORRECTIVE_ACTION: NONE EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification		Documentation		Subsystem
MER - 0	**MET:** 005:21:23	Problem	**FIAR**	**IFA** STS-41C-V-18		Atmospheric
	GMT: 103:11:21		**SPR**	**UA**		Revitalization Subsytem
			IPR	**PR**		**Manager:**
						Engineer:

Title: ECLSS Gaseous Nitrogen System 2 Regulator Pressure High Following Cabin Repressurization. (ORB)

Summary: DISCUSSION: The system 2 nitrogen regulator pressure increased following the repressurization of the cabin to 14.7 psia. No corresponding increase was observed in the system 1 regulator pressure indicating a possible problem with the system 2 regulator.

Postflight testing at KSC confirmed that the system 2 regulator performed within the specification requirements during flow and lockup. However, a small inspecification leak of 0.76 sccm was detected in system 1 during the testing. The small leak was not isolated, but it is of no concern for systems operation. The high-flow conditions during repressurization resulted in low nitrogen temperatures in the small volume of gas trapped between the regulator and downstream components. The subsequent warming of this gas caused a pressure increase in system 2. The leak in system 1 prevented a corresponding pressure increase. CONCLUSION: A small leak in system 1 nitrogen prevented the comparable increase in system 1 and 2 pressures that was expected due to thermal expansion of the small volume of gas trapped in the lines. The system regulator performance was normal during KSC testing. CORRECTIVE_ACTION: None required. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:22:34	Problem	**FIAR**	**IFA** STS-41C-V-19	OMS
	GMT: 104:12:32		**SPR** 13F009	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Left Orbital Maneuvering System Total Fuel Quantity Gage Read Low. (ORB)

Summary: DISCUSSION: During the OMS (orbital maneuvering system) deorbit maneuver, the left gage total quantity indication suddenly shifted downward by 10 percent at an actual total quantity of 18 percent. The shift subsequently caused an erroneous low-level indication from the left OMS fuel gaging system. Each gaging system provides a total and aft gage reading. All four aft fuel gages continued to operate satisfactorily.

Troubleshooting at KSC of the probe electronics and totalizer has not repeated the problem. Both the probe electronics and the totalizer have been removed and returned to the vendor for further failure analysis. The likelihood of a failure of this nature being in the probe is extremely remote. CONCLUSION: The cause of the downward shift in the left OMS total fuel quantity is unknown. Failure analysis of the probe electronics and the totalizer will continue at the vendor. Should the failure recur, alternate methods of determining fuel quantity are available. CORRECTIVE_ACTION: The probe electronics and totalizer have been replaced with new units in the left OMS pod for STS 41-D. The totalizer design has been upgraded to eliminnate a problem which occurred on previous flights when the gaging system transitioned from the forward to the aft probe. Further vendor failure analysis will be tracked on CAR 13F009. CAR ANALYSIS: Unable to reproduce problem. No corrective action planned. This investigation is continued in flight problem 41D-08. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:02:45	Problem	**FIAR**	**IFA** STS-41C-V-20	RMS
	GMT: 103:16:43		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Remote Manipulator System Wrist Roll Joint Moved When Arm Was In Single Mode Pitch. (GFE)

Summary: DISCUSSION: Unexplained wrist roll movement occurred during single-mode RMS (remote manipulator system) operation at about 10:16:43 G.m.t.; once with elbow pitch selected and once with shoulder pitch selected. After each occurrence, the software drove the wrist roll joint back to the correct position.

Review of the flight data indicated that the brakes were released from the RMS each time that the unexplained wrist roll motion was observed. The data also indicated smaller motions of the shoulder pitch and wrist pitch joints. This small initial motion, when the brakes are released, is a normal occurrence of the RMS joints. The magnitude of the movement for a particular joint is dependent upon the commands prior to the brakes being applied. After this movement, the joints are driven back to their correct positions by the position-hold function of the software. CONCLUSION: The unexplained wrist roll movement that occurred during single-mode pitch RMS operation was caused when the brakes were released. This is considered normal RMS operation. The wrist roll joint was driven back to the correct position by the position-hold software. CORRECTIVE_ACTION: NONE EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-41C-V-21	MECH
	GMT:		**SPR** 13F007	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: All Four Brakes Damaged (ORB)

Summary: DISCUSSION: After touchdown, the brakes were applied at 110 knots ground speed. The deceleration varied from 12 to 6 ft/sec/sec during the 2142 feet of braked roll distance. Brake energy varied from 14 million ft-lb (RHOB and LHIB) to 16 and 17 million ft-lb (LHOB and RHIB, respectively)

Postflight inspection, removal and disassembly of the brakes revealed that all four brakes experienced some degree of damage. The Beryllium was crackedon rotors 3 and 4 of both the RHOB and LHIB brakes and on rotor 4 of the LHOB brake. Carbon edges were chipped, TZM washers were missing, drive clip tails were bent and carbon surface debris damage was found on the outer two rotors or stators of all four brakes. Damage was very similar to that which occured on STS-7 (also a lake-bed landing(except that this time the damage was on both the left and right sides. Metallurgical analysis of the failed brake parts is in progress. Instrumentation will be added on OV-099 to better understand the brake/hydraulic dynamic interaction. Ground tests have been unable to induce a dynamic interaction similar to the flight response. CONCLUSIONS: All four brakes were damaged during braked roll due to dynamic loading during braking. This damage is not a safety issue. Hard braking was demonstrated on STS-6 (OV-099) as a development test objective. CORRECTIVE ACTION: New wheel drive lug inserts are on all four wheels and 360-deg axle/torque tube saddles have been installed on the two outboard brakes for STS 41-D. 48 channels of brake instrumentation have been proposed for the STS 41-G flight of OV-099. A redesigned rotor drive lug chip is being manufactured for possible installation on STS 41-F. EFFECTS ON SUBSEQUENT MISSIONS: None [the following is not the original problem report, but was included in the computer database - see STS-41G-17] [DISCUSSION: Postflight inspection, removal, and disassembly of the brakes revealed that three of the four brakes experienced damage. The beryllium was cracked on rotor 4 of the left inboard and both the right inboard and outboard brakes. Rotor 3 of the right outboard brake also had cracks in the beryllium. All three brakes had chipped carbon edges, scored linings, missing TZM washers and bent drive clips. Damage was very similar to that which occurred on STS-7 and STS 41-C with OV-099. Analysis of the 49 channels of brake instrumentation added to OV-099 for STS 41-G is expected to characterize the brake/hydraulic dynamic interaction. Data analysis is continuing to better understand the problem and to identify possible fixes to eliminate brake damage. CONCLUSION: Three of the four brakes were damaged during braking. The brake damage is not considered a safety issue. Hard braking was

demonstrated on STS-6 (OV-099) as a development flight test objective. CORRECTIVE_ACTION: Data analysis is continuing to better understand the cause of the high dynamic loading during braking and to identify possible fixes to eliminate brake damage. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE]

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:01:08	Problem	**FIAR** F-EMU-136-4C01	**IFA** STS-41C-V-22	CREW
	GMT: 099:15:06		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Extravehicular Mobility Unit -1 Sublimator "Pressure High" Messages. (GFE)

Summary: DISCUSSION: High EMU (extravehicular mobility unit) sublimator pressure alarms occurred on EMU-1 during both the first and second extravehicular activities. The frequency of the alarms could be reduced by changing the cooling control valve setting to the full-cold position, thus increasing the heat load on the sublimator; however, the crewman became uncomfortably cold under these conditions. Standard malfunction procedures which are to cycle the sublimator cooling water flow off and on as needed corrected the pressure each time.

Postflight examinations revealed particles that were small enough to pass through the 38-micron filter had lodged on the seat of the sublimator pressure regulator and caused the regulator to leak. The particles included a metallic aluminum chip and a silicon dioxide chip approximately 25 microns in size. Additionally, smaller metallic aluminum and iron oxide particles (2 to 10 microns in size) were found. Ninety-seven percent of the particles consisted of iron/aluminum/silica. The source of the silica has not been determined. The iron comes from the new stainless steel valve module parts in the life support system and the aluminum from the remaining servicing and cooling umbilical parts that are not stainless steel. The regulator has been removed and replaced. CONCLUSION: Contamination in the EMU-1 pressure regulator created a leakage resulting in high sublimator pressures. CORRECTIVE_ACTION: The water loops have received a more extensive multiple orientation polishing and flushing with a check for particulates for STS 41-D. An attempt will be made to reduce the mesh of the regulator-upstream filter to 15 microns for STS 41-G. Long-term corrective actions include the study on using a 2-micron screen plus an ion-exchange filter bed upstream of the feedwater regulator, or eliminating the regulator altogether by operating the water system at a lower pressure. FIAR ANALYSIS: Post-flight examination showed that the feedwater pressure regulator ball/seat area showed depressed areas where particulate contamination had been imbedded and were subsequently washed away. Inlet filter size was reduced and has been added to the limited life equipment list because it must now be cleaned or replaced prior to each mission. Further discussion is contained in FIAR F-EMU-136-4C01. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-41C-V-23	CREW
	GMT:		**SPR** 13F012	**UA**	**Manager:**

IPR **PR**

Engineer:

Title: Port Slide Wire Braided Covering Frayed And Bound Up The Tether Slide. ()

Summary: DISCUSSION: The crew reported that the port slide wire braided covering was frayed and the EVA (extravehicular activity) tether slide bound up while the crewman was traversing in the payload bay. Postflight inspection showed that the Teflon braid had been completely severed at five locations. At one of these locations the braided covering had gathered so much that the EVA tether slide would bind as it was moved along the slide wire.

The most probable cause of the damage to the braided covering was inadvertent contact with the facility platforms in the OPF (Orbiter Processing Facility) and the PGHM (payload ground handling mechanism) on the pad that were used to access the Orbiter payload bay. The slide wire comes in close proximity to these platforms and may have been pushed against the platforms during ground operations. Review of inflight TV (television) did show that the starboard slide wire was caught on a freon line; however, postflight inspection did not reveal any damage to either the slide wire in that area or to the freon line. CONCLUSION: Damage to the port slide wire was most probably caused by contact with the facility platforms during ground operations. CORRECTIVE_ACTION: The facility platforms have been examined and three areas where incidental contact with the slide wire could occur have been identified. KSC engineering is taking appropriate action to prevent a recurrence of this potential problem. Ground procedures will be reviewed to assure that appropriate precautions are employed to assure the slide wire is not damaged during ground operations. RTV (room temperature vulcanizing) material has been applied to the exposed freon line attachment bolts to reduce the potential for abrasion or hang-up during on-orbit activities. The OV-103 wire has been inspected and is acceptable for flight. The OV-099 wire will be removed and replaced. Consideration is being given to changing the wire material. The slide wire is being tested to determine if it is possible to increase the tension of the line to reduce line play, thus alleviating the potential for the wire snagging. Failure analysis will be tracked on CAR 13F012. CAR ANALYSIS: Damaged slidewire has been repaired. Slidewire protective covers have been provided to prevent damage during ground operations. A requirement has been added to OMI V6003 to visually inspect slidewires for damage prior to last closing of payload bay doors, beginning with STS-41G. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR** HEN-0044F	**IFA** STS-41C-V-24	STR
	GMT:		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Photo And Galley Brackets Debonded. (GFE)

Summary: DISCUSSION: The crew reported that photo bracket ML94B, located on the starboard middeck above the sleep restraints, came off when one of the crewmen accidentally kicked the camera attached to the bracket. The bracket on the galley to which the personal-hygiene privacy curtain is attached also became unbonded early in

the flight.

The crew used velcro to secure the privacy curtain and the camera was relocated to an alternate location, therefore, neither of these incidents resulted in any impact to the mission. CONCLUSION: The camera bracket was debonded due to excessive external force applied accidentally by a crewman. The cause of the galley bracket failure is unknown at this time. CORRECTIVE_ACTION: The photo bracket will be rebonded using standard procedures. The galley bracket will be evaluated when the galley is removed (ref. problem STS 41C-25). This problem will be tracked on FIAR No. HEN-0044F. FIAR ANALYSIS: Bracket was not debonded from galley. Debonded brackets were rebonded at KSC and are not addressed in conjunction with the galley. [not included in original problem report]
EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 000:04:02	Problem	**FIAR**	**IFA** STS-41C-V-25	CREW
	GMT: 097:18:00		**SPR** HEN-0042F	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Galley Water Dispenser Failed To Shut Off Water Flow. (GFE)

Summary: DISCUSSION: The crew reported that the water dispenser on the galley failed to shut off when used the first time on orbit. The crew closed manual valve MV-3 (the ambient water supply line shut off valve) to stop the water flow. The water dispenser operated normally when used later the same day and continued to operate normally for the rest of the mission.

CONCLUSION: The cause of the problem is awaiting troubleshooting. CORRECTIVE_ACTION: Troubleshooting will be performed on the galley after its removal. This action will be tracked on FIAR HEN-0042F. No action is required for STS 41-D since the galley is not being flown. FIAR ANALYSIS: Camera circuit breaker was left open after replacement of another component. [not included in original problem report] EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-41C-V-26	INS
	GMT:		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: External Tank Separation 35-MM Camera Failed To Operate. (GFE)

Summary: DISCUSSION: The separation camera heater was commanded on at T-29 hours. MDM FF1 was removed and replaced at T-11 hours. Safing procedures for MDM FF1 required main A and control busses AB1 and AB2 to be powered down. The dropping of these control busses also powered down MDM FA1. This created an MDM FA1 reset. Therefore, the heater command (V56K9010X) from MDM FA1 was removed and the separation camera heater was no longer powered on. The heater circuit also provides power to the operate logic in the camera. The inflight software command (V72M7868) (camera on) was sent at the proper time intervals, but the separation camera did not run because of the absence of heater power. The separation camera heater command (V56K9010X) was overlooked during the T-3 hour MDM discrete check.

CONCLUSION: The camera did not run because the reset of the camera heater command was not accomplished during the T-3 hour MDM discrete check. Had this been a flight critical function, either the redundant set launch sequencer or the cyclic updates to the MDM's (occur in the flight software (OPS 1)) would have flagged and/or corrected the function. CORRECTIVE_ACTION: KSC procedures will be modified to insure that the T-3 hour MDM discrete check is complete. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE